TG: @Chalnaayaaar

Exercise - I (Conceptual Questions) Build Up Your Understanding

INTRODUCTION TO MODIFICATIONS OF MITOSIS

1. During G_2 - phase a diploid cell contains the amount of DNA equal to a :-
(1) Diploid cell
(2) Tetraploid cell
(3) Haploid cell
(4) Hexaploid cell

2. In which order, cytokinesis occurs in plants:
(1) Centripetal (2) Centrifugal
(3) Oblique (4) Equatorial

3. Nuclear envelope reappears at :-
(1) Metaphase (2) Prophase
(3) Anaphase (4) Telophase

4. Which does not occurs in prophase ?
(1) Decondensation of chromatin
(2) Condensation of chromatin
(3) Appearance of chromosome
(4) Disappearance of nuclear membrane and nucleolus

5. In which stage of cell division, number of chromosomes can be best counted?
(1) Prophase (2) Metaphase
(3) Telophase (4) Interphase

6. How many chromosomes shall be present in a diploid cell at mitotic anaphase if ovum of same species has ten chromosomes?
(1) 10 (Ten) (2) 20 (Twenty)
(3) 30 (Thirty) (4) 40 (Forty)

7. In which stage of mitosis, the chromosomes are composed of two chromatids ?
(1) Prophase & metaphase
(2) Anaphase and telophase
(3) Prophase and telophase
(4) Metaphase and anaphase

8. Gap between division phase and start of DNA-replication is called :-
(1) G_1 - phase (2) G_2 - phase
(3) M - phase (4) Interkinesis

9. During cell division, spindle fibres attach to which part of chromosome ?
(1) Primary constriction
(2) Secondary constriction
(3) Telomere
(4) Satellite

10. During which stage a diploid cell becomes tetraploid in mitosis?
(1) G_2 (2) Prophase
(3) Metaphase (4) Anaphase

11. Division of centromere occurs in:-
(1) Prophase (2) Metaphase
(3) Anaphase (4) Telophase

12. What happens in synthesis phase during cell cycle?
(1) DNA replication
(2) Chromosome number becomes double
(3) Formation of two nuclei
(4) Synthesis of tubulin proteins

13. Reappearance of nucleolus along with thinning & elongation in chromosomes are diagnostic characters for the :-
(1) Anaphase (2) Metaphase
(3) Interphase (4) Telophase

14. Condensation of chromosomes and appearance of astral rays occur during :-
(1) Prophase (2) Metaphase
(3) Anaphase (4) Telophase

15. Chromosomal morphology (Structure) is best observed at :-
(1) Prophase (2) Metaphase
(3) Interphase (4) Anaphase

16. M–phase of cell cycle consist of :–
(1) G_1, S and G_2 phase
(2) Prophase, Metaphase, Anaphase, Telophase
(3) Interphase, Prophase, Metaphase, Anaphase, Telophase
(4) Only prophase

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17. If the cell is diploid in G_1 than after the S phase cell remain/become :-
(1) n (2) 4n
(3) 8n (4) 2n

18. Nuclear membrane disappears in :–
(1) Late prophase (2) Early prophase
(3) Metaphase (4) Telophase

19. Pre - DNA synthesis phase is:-
(1) G_1 - phase (2) G_2 - phase
(3) S-phase (4) Prophase

20. How many steps of division will occur in an isolated tip cell to form 128 cells ?
(1) 128 (2) 127
(3) 32 (4) 7

21. The number of chromatids in a chromosome at G_2 state of cell cycle will be:-
(1) One (2) Two
(3) Four (4) Eight

22. Many cells function properly and divide mitotically even though they do not have :-
(1) Plasma membrane
(2) Cytoskeleton
(3) Mitochondria
(4) Plastids

23. Centromere is required for –
(1) Movement of chromosomes towards poles
(2) Cytoplasmic cleavage
(3) Crossing over
(4) Transcription

24. At which stage of the cell cycle are histone proteins synthesized in a eukaryotic cell ?
(1) During telophase
(2) During S–phase
(3) During G_2–phase
(4) During entire prophase

25. Prophase which follows the S and G_2 phases of interphase, is the first stage of :-
(1) Meiosis-II (2) Karyokinesis
(3) Interphase (4) G_1 phase

26. The two asters together with spindle fibres form:-
(1) Mitotic apparatus (2) Centromere
(3) Astral fibres (4) Centrosome

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27. In prophase centrosome, which had undergone duplication during interphase, begins to move towards :
(1) Same pole of the cell
(2) Opposite poles of the cell
(3) One towards centre while another towards pole
(4) Both towards centre

MEIOSIS, SIGNIFICANCE OF MEIOSIS, DIFFERENCES BETWEEN MITOSIS AND MEIOSIS

28. Which of the following not occurs in Anaphase–I but occurs in Anaphase–II :–
(1) Condensation of chromosomes
(2) Poleward movement of chromosomes
(3) Shortening of spindle fibres
(4) Splitting of centromere

29. Crossing over takes place in :-
(1) Zygotene (2) Pachytene
(3) Diplotene (4) Diakinesis

30. Which of the two events maintain the constant number of chromosomes across generations?
(1) Mitosis and Meiosis
(2) Meiosis and fertilisation
(3) Fertilisation and mitosis
(4) Only meiosis

31. Match the column–I with column–II and select the correct answer :-

Column–I	**Column–II**
(A) Pachytene	(i) Bouquet stage
(B) Zygotene	(ii) Chiasmata visible
(C) Diplotene	(iii) Terminalisation
(D) Leptotene	(iv) Gene exchange
(E) Diakinesis	(v) Synapsis

Options :-
(1) A–i, B–ii, C–iii, D–iv, E–v
(2) A–iv, B–v, C–ii, D–i, E–iii
(3) A–iii, B–iv, C–v, D–ii, E–i
(4) A–ii, B–iii, C–iv, D–i, E–v

32. Which part of plant is suitable for the study of meiosis?
(1) Root apex (2) Ovary
(3) Anther (4) Shoot apex

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33. Slipping of chiasmata towards the ends of bivalent is called :-
(1) Terminalisation (2) Diakinesis
(3) Interkinesis (4) Congression

34. "Bouquet-stage" occur in which sub stages of prophase-I ?
(1) Leptotene (2) Zygotene
(3) Pachytene (4) Diplotene

35. At anaphase - II of meiosis each chromosome contains:-
(1) 4 chromatids (2) 3 chromatids
(3) 2 chromatids (4) 1 chromatid

36. In Anaphase – I each chromosome composed of:-
(1) One chromatid
(2) Two chromatids
(3) Four chromatids
(4) Many chromatids

37. In meiosis, division of centromere occurs during:-
(1) Interphase (2) Anaphase - I
(3) Anaphase - II (4) Metaphase - I

38. In meiosis, nuclear membrane and nucleolus disappear during :-
(1) Zygotene (2) Pachytene
(3) Diakinesis (4) Metaphase - I

39. Separation of homologous chromosomes during anaphase-I is called :-
(1) Synapsis
(2) Disjunction
(3) Nondisjunction
(4) Crossing over

40. Diakinesis represents :-
(1) transition to prophase
(2) transition to metaphase
(3) transition to anaphase
(4) transition to telophase

41. Synaptonemal complex is characteristic of :-
(1) Mitotic chromosomes
(2) Leptotene chromosomes
(3) Paired meiotic chromosomes
(4) Metaphase

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42. Each chromosome composed of one chromatid in:-
(1) Anaphase – I (2) Anaphase – II
(3) Metaphase – I (4) Metaphase – II

43. If the number of bivalents are 8 in metaphase–I, what shall be the number of chromosomes in daughter cells after meiosis–I and meiosis–II respectively:-
(1) 8 and 4 (2) 4 and 4
(3) 8 and 8 (4) 16 and 8

44. Which of the following not occurs in anaphase-I?
(1) Segregation of homologous chromosomes
(2) Shortening in spindle fibres
(3) Poleward movement of chromosomes
(4) Division of centromere

45. In meiosis :-
(1) Division of nucleus twice but replication of DNA only once
(2) Division of nucleus twice and replication of DNA twice
(3) Division of nucleus once and replication of DNA is also once
(4) Division of nucleus once and DNA replication is twice

46. After meiosis–I :-
(1) the two chromatids of a chromosome are genetically similar
(2) the two chromatids of a chromosome are genetically different
(3) There occurs only one chromatid in each chromosome
(4) Four similar daughter cells are formed

47. The correct sequence of prophase–I of meiosis is :–
(1) Leptotene, pachytene, zygotene, diplotene, diakinesis
(2) Leptotene, diplotene, pachytene, zygotene, diakinesis
(3) Leptotene, zygotene, pachytene, diplotene, diakinesis
(4) Leptotene, zygotene, diakinesis, diplotene, pachytene

48. Which of the following is called heterotypic division ?
(1) Meiosis–I (2) Meiosis–II
(3) Mitosis (4) Amitosis

49. DNA replication occurs before :–
(1) Mitosis and meiosis–I
(2) Mitosis, meiosis–I and meiosis–II
(3) Meiosis-I only
(4) Mitosis only

50. Thick–thread stage is :–
(1) Leptotene (2) Zygotene
(3) Pachytene (4) Diplotene

51. Crossing over that results in genetic recombination in higher organisms occurs between –
(1) Non-sister chromatids of a bivalent
(2) Two daughter nuclei
(3) Two different bivalents
(4) Sister chromatids of a bivalent

52. When synapsis is complete all along the chromosome, the cell is said to have entered a stage called :-
(1) Zygotene (2) Pachytene
(3) Diplotene (4) Diakinesis

53. If in a diploid plant cell the 'n' value is 16 then what is possible in metaphase - I of meiosis ?
(1) 32 Bivalents (2) 64 Bivalents
(3) 16 Bivalents (4) 8 Bivalents

54. Which one of the following statements is incorrect for interkinesis ?
(1) It is the stage between the two subphases (I & II) of a meiotic division
(2) There is no replication of DNA
(3) DNA replicate but chromosome number remains same
(4) It is generally short lived.

55. At anaphase-II, sister chromatids move towards opposite poles of the cell by :
(1) Contraction in spindle fibre attached to kinetochores
(2) Shortening of microtubules attached to kinetochores
(3) Lengthening of microtubules attached to kinetochores
(4) Relaxation in spindle fibre attached to kinetochores

EXERCISE-I (Conceptual Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	2	2	4	1	2	4	1	1	1	4	3	1	4	1	2
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	2	4	1	1	4	2	4	1	2	2	1	2	4	2	2
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	2	3	1	1	4	2	3	3	2	2	3	2	3	4	1
Question	46	47	48	49	50	51	52	53	54	55					
Answer	2	3	1	1	3	1	2	3	3	2					

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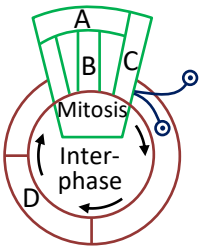
Exercise - II (Previous Year Questions) AIPMT/NEET

AIPMT 2009

1. Synapsis occurs between :-
(1) Two homologous chromosomes
(2) A male and a female gamete
(3) mRNA and ribosomes
(4) Spindle fibres and centromere

2. Given below is a schematic break-up of the phases/stages of cell cycle :-



Which one of the following is the correct indication of the stage/phase in the cell cycle?
(1) A – Cytokinesis
(2) B – Metaphase
(3) C – Karyokinesis
(4) D – Synthetic phase

AIPMT Pre. 2010

3. During mitosis ER and nucleolus begin to disappear at :
(1) Early prophase
(2) Late prophase
(3) Early metaphase
(4) Late metaphase

4. Which stages of cell division do the following figures A and B represent respectively ?

(A) (B)

(1) Prophase – Anaphase
(2) Metaphase – Telophase
(3) Telophase – Metaphase
(4) Late Anaphase – Prophase

AIPMT Pre. 2011

5. Select the correct option with respect to mitosis
(1) Chromatids separate but remain in the centre of the cell in anaphase.
(2) Chromatids start moving towards opposite poles in telophase.
(3) Golgi complex and endoplasmic reticulum are still visible at the end of prophase.
(4) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase

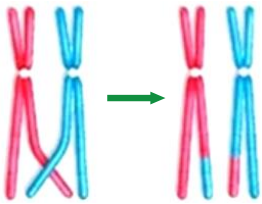
AIPMT Mains-2011

6. At metaphase, chromosomes are attached to the spindle fibres by their :-
(1) Centromere
(2) Satellites
(3) Secondary constrictions
(4) Kinetochores

AIPMT Pre. 2012

7. During gamete formation, the enzyme recombinase participates during :-
(1) Prophase-I
(2) Prophase-II
(3) Metaphase-I
(4) Anaphase-II

8. Given below is the representation of a certain event at a particular stage of a type of cell division. Which is this stage ?



(1) Prophase of Mitosis
(2) Both prophase and metaphase of mitosis
(3) Prophase I during meiosis
(4) Prophase II during meiosis

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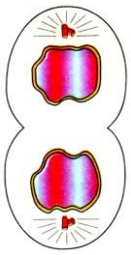
AIPMT Mains 2012

9. Identify the meiotic stage in which the homologous chromosomes separate while the sister chromatids remain associated at their centromeres :-
(1) Anaphase I (2) Anaphase II
(3) Metaphase I (4) Metaphase II

NEET-UG 2013

10. A stage in cell division is shown in the figure. Select the answer which gives correct identification of the stage with its characteristics.



(1)	Telophase	Endoplasmic reticulum and nucleolus not reformed yet.
(2)	Telophase	Nuclear envelop reforms, Golgi complex reforms.
(3)	Late anaphase	Chromosomes move away from equatorial plate, Golgi complex not present.
(4)	Cytokinesis	Cell plate formed, mitochondria distributed between two daughter cells.

11. The complex formed by a pair of synapsed homologous chromosomes is called :
(1) Axoneme (2) Equatorial plate
(3) Kinetochore (4) Bivalent

AIPMT 2014

12. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C ?
(1) G_0 and G_1 (2) G_1 and S
(3) Only G_2 (4) G_2 and M

13. In 'S' phase of the cell cycle :-
(1) Amount of DNA doubles in each cell.
(2) Amount of DNA remains same in each cell.
(3) Chromosome number is increased.
(4) Amount of DNA is reduced to half in each cell.

14. The enzyme recombinase is required at which stage of meiosis :
(1) Pachytene (2) Zygotene
(3) Diplotene (4) Diakinesis

AIPMT 2015

15. A somatic cell that has just completed the S phase of its cell cycle, as compared to gamete of the same species, has :
(1) same number of chromosomes but twice the amount of DNA
(2) twice the number of chromosomes and four times the amount of DNA
(3) four times the number of chromosomes and twice the amount of DNA
(4) twice the number of chromosomes and twice the amount of DNA

Re-AIPMT 2015

16. Arrange the following events of meiosis in correct sequence :
(a) Crossing over
(b) Synapsis
(c) Terminalisation of chiasmata
(d) Disappearance of nucleolus
(1) (b), (c), (d), (a) (2) (b), (a), (d), (c)
(3) (b), (a), (c), (d) (4) (a), (b), (c), (d)

NEET-I 2016

17. Spindle fibres attach on to :-
(1) Telomere of the chromosome
(2) Kinetochore of the chromosome
(3) Centromere of the chromosome
(4) Kinetosome of the chromosome

18. In meiosis crossing over is initiated at :
(1) Pachytene (2) Leptotene
(3) Zygotene (4) Diplotene

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NEET-II 2016

19. During cell growth, DNA synthesis takes place in:-
(1) G_2 phase (2) M phase
(3) S phase (4) G_1 phase

20. When cell has stalled DNA replication fork, which checkpoint should be predominantly activated?
(1) M (2) Both G_2/M and M
(3) G_1/S (4) G_2/M

21. Match the stages of meiosis in **Column–I** to their characteristic features in **Column–II** and select the correct option using the codes given below :

Column-I		Column-II	
a	Pachytene	i	Pairing of homologous chromosomes
b	Metaphase-I	ii	Terminalization of chiasmata
c	Diakinesis	iii	Crossing over takes place
d	Zygotene	iv	Chromosomes align at equatorial plate

Codes :

	a	b	c	d
(1)	ii	iv	iii	i
(2)	iv	iii	ii	i
(3)	iii	iv	ii	i
(4)	i	iv	ii	iii

NEET (UG) 2017

22. Which of the following options gives the correct sequence of events during mitosis ?
(1) Condensation → nuclear membrane disassembly → arrangement at equator → centromere division → segregation → telophase
(2) Condensation→ crossing over → nuclear membrane disassembly → segregation → telophase
(3) Condensation → arrangement at equator→ centromere division → segregation → telophase
(4) Condensation → nuclear membrane disassembly → crossing over → segregation → telophase

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23. Anaphase Promoting Complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur ?
(1) Chromosomes will be fragmented
(2) Chromosomes will not segregate
(3) Recombination of chromosome arms will occur
(4) Chromosomes will not condense

NEET (UG) 2018

24. The stage during which separation of the paired homologous chromosomes begins is
(1) Pachytene (2) Diplotene
(3) Diakinesis (4) Zygotene

NEET (UG) 2019

25. The **correct** sequence of phases of cell cycle is :
(1) M→ G_1 → G_2 → S (2)G_1→ G_2 → S → M
(3) S→ G_1 → G_2 → M (4)G_1→ S → G_2 → M

26. Cells in G_0 phase:
(1) exit the cell cycle
(2) enter the cell cycle
(3) suspend the cell cycle
(4) terminate the cell cycle

NEET (UG) 2019 (Odisha)

27. After meiosis-I, the resultant daughter cells have:-
(1) Same amount of DNA as in the parent cell in S phase
(2) Twice the amount of DNA in comparison to haploid gamete.
(3) Same amount of DNA in comparison to haploid gamete
(4) Four times the amount of DNA in comparison to haploid gamete

28. Crossing over takes place between which chromatids and in which stage of the cell cycle ?

(1) Non-sister chromatids of non-homologous chromosomes at Zygotene stage of prophase I.
(2) Non-sister chromatids of homologous chromosomes at Pachytene stage of prophase I.
(3) Non-sister chromatids of homologous chromosomes at Zygotene stage of prophase I.
(4) Non-sister chromatids of non-homologous chromosomes at Pachytene stage of prophase I.

NEET (UG) 2020

29. Match the following with respect to meiosis:

(a) Zygotene	(i) Terminalization
(b) Pachytene	(ii) Chiasmata
(c) Diplotene	(iii) Crossing over
(d) Diakinesis	(iv) Synapsis

Select the **correct** option from the following:

	(a)	**(b)**	**(c)**	**(d)**
(1)	(ii)	(iv)	(iii)	(i)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(i)	(ii)	(iv)	(iii)

30. Identify the **correct** statement with regard to G_1 phase (Gap 1) of interphase.
(1) Nuclear Division takes place.
(2) DNA synthesis or replication takes place.
(3) Reorganisation of all cell components takes place.
(4) Cell is metabolically active, grows but does not replicate its DNA.

31. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G_0). This process occurs at the end of :
(1) G_2 phase (2) M phase
(3) G_1 phase (4) S phase

32. Dissolution of the synaptonemal complex occurs during :
(1) Leptotene (2) Pachytene
(3) Zygotene (4) Diplotene

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NEET (UG) 2020 (Covid-19)

33. Attachment of spindle fibres to kinetochores of chromosomes becomes evident in :
(1) Anaphase (2) Telophase
(3) Prophase (4) Metaphase

34. In a mitotic cycle, the correct sequence of phases is
(1) S, G_1, G_2, M (2) G_1, S, G_2, M
(3) M, G_1, G_2, S (4) G_1, G_2, S, M

35. During Meiosis-I, in which stage synapsis takes place ?
(1) Pachytene (2) Zygotene
(3) Diplotene (4) Leptotene

36. Match the following events that occur in their respective phases of cell cycle and select the correct option :

(a)	G_1 phase	(i)	Cell grows and organelle duplication
(b)	S phase	(ii)	DNA replication and chromosome duplication
(c)	G_2 phase	(iii)	Cytoplasmic growth
(d)	Metaphase in M-phase	(iv)	Alignment of chromosomes

(1) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(2) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
(3) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
(4) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

NEET (UG) 2021

37. Which of the following stages of meiosis involves division of centromere ?
(1) Metaphase I (2) Metaphase II
(3) Anaphase II (4) Telophase II

38. Match **List -I** with **List - II.**

List -I		**List -II**	
(a)	S phase	(i)	Proteins are synthesized
(b)	G_2 phase	(ii)	Inactive phase
(c)	Quiescent stage	(iii)	Interval between mitosis and initiation of DNA replication
(d)	G_1 phase	(iv)	DNA replication

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Choose the **correct** answer from the options given below.

	(a)	(b)	(c)	(d)
(1)	(iii)	(ii)	(i)	(iv)
(2)	(iv)	(ii)	(iii)	(i)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(ii)	(iv)	(iii)	(i)

39. The fruit fly has 8 chromosomes (2n) in each cell. During interphase of Mitosis if the number of chromosomes at G_1 phase is 8, what would be the number of chromosomes after S phase ?

(1) 8 (2) 16 (3) 4 (4) 32

40. The centriole undergoes duplication during:

(1) S-phase
(2) Prophase
(3) Metaphase
(4) G_2 phase

41. Which stage of meiotic prophase shows terminalisation of chiasmata as its distinctive feature?

(1) Leptotene (2) Zygotene
(3) Diakinesis (4) Pachytene

NEET (UG) 2022

42. The appearance of recombination nodules on homologous chromosomes during meiosis characterizes:

(1) Bivalent
(2) Sites at which crossing over occurs
(3) Terminalization
(4) Synaptonemal complex

43. Which one of the following never occurs during mitotic cell division ?

(1) Movement of centrioles towards opposite poles
(2) Pairing of homologous chromosomes
(3) Coiling and condensation of the chromatids
(4) Spindle fibres attach to kinetochores of chromosomes

44. Select the **incorrect** statement with reference to mitosis:

(1) Spindle fibres attach to centromere of chromosomes.
(2) Chromosomes decondense at telophase.
(3) Splitting of centromere occurs at anaphase.
(4) All the chromosomes lie at the equator at metaphase.

45. Regarding Meiosis, which of the statements is **incorrect** ?

(1) DNA replication occurs in S phase of Meiosis-II
(2) Pairing of homologous chromosomes and recombination occurs in Meiosis-I
(3) Four haploid cells are formed at the end of Meiosis-II
(4) There are two stages in Meiosis, Meiosis-I and II

Re-NEET (UG) 2022

46. Which stage of meiosis can last for months or years in the oocytes of some verterbrates ?

(1) Leptotene (2) Pachytene
(3) Diplotene (4) Diakinesis

47. In meiosis, crossing over and exchange of genetic material between homologous chromosomes are catalyzed by the enzyme.

(1) Phosphorylase (2) Recombinase
(3) Transferase (4) Polymerase

48. Identify the **correct** sequence of events during Prophase I of meiosis :

(a) Synapsis of homologous chromosomes
(b) Chromosomes become gradually visible under microscope
(c) Crossing over between non-sister chromatids of homologous chromosomes
(d) Terminalisation of chiasmata
(e) Dissolution of synaptonemal complex

Choose the **correct answer** from the options given below :

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(1) (a), (b), (c), (d), (e)
(2) (b), (c), (d), (e), (a)
(3) (b), (a), (c), (e), (d)
(4) (a), (c), (d), (e), (b)

49. Bivalent or Tetrad formation is a characteristic feature observed during :
(1) Synaptonemal complex in zygotene stage
(2) Chiasmata in Diplotene stage
(3) Synaptonemal complex in Pachytene stage
(4) Chiasmata in zygotene stage

50. With respect to metaphase, which of the following statements is incorrect ?
(1) Complete disintegration of nuclear envelope takes place
(2) Chromosomes are highly condensed
(3) Metaphase chromosomes are made up of four sister chromatids held together by centromere
(4) Chromosomes lie at the equator of the cell

EXERCISE-II (Previous Year Questions) ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	1	4	2	4	4	4	1	3	1	2	4	4	1	1	2
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	3	2	1	3	4	3	1	2	2	4	3	2	2	3	4
Question	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Answer	3	4	4	2	2	4	3	3	1	1	3	2	2	1	1
Question	46	47	48	49	50										
Answer	3	2	3	1	3										

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Exercise - III Master Your Understanding

EXERCISE-III(A) NCERT BASED QUESTIONS

1. Which one is correct for G_0 stage ?

I. It is a quiescent stage.
II. In this phase cell cycle is stopped
III. G_0 cells do not proliferate but metabolically active
IV. G_0 cells can divide in response to some stimulus

Options :-
(1) All are correct
(2) Only I,II,III are correct
(3) Only I,II are correct
(4) Only I and IV are correct

2. Which of the following is **not** correctly matches a phase of the cell cycle with its function ?

(1) Second gap phase	Period of cytoplasmic growth
(2) First gap phase	Most of the organelle duplication
(3) Interphase	Phase of preparation for cell division
(4) DNA synthesis phase	Doubling of number of chromosomes in cell

3. Mark **incorrect** statements :-

(A) Meiosis involves only a single cycle of DNA replication
(B) Four haploid cells are formed at the end of meiosis–I
(C) Meiosis occurs in diploid cells
(D) In yeast, cell cycle takes about 90 minutes.

Options :-
(1) A and B (2) A and C
(3) Only B (4) All are correct

4. Prophase–I of meiotic division is typically longer and more complex, it is subdivided into five phases, on the basis of :-

(1) Staining
(2) Behaviour of chromosomes
(3) Duration
(4) Number of chromosomes

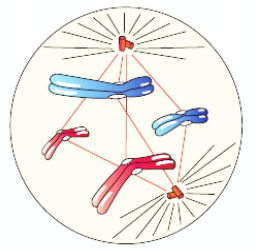
5. Arrange the following events of meiosis in the correct sequence -

A. Terminalisation of chiasmata
B. Crossing over
C. Synapsis
D. Disjunction of chromosomes
E. Dissolution of synaptonemal complex

The correct sequence is-

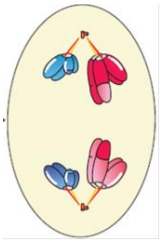
(1) A → B → C → D → E
(2) E → D → C → B → A
(3) C → B → D → E → A
(4) C → B → E → A → D

6. Identify the following diagram-



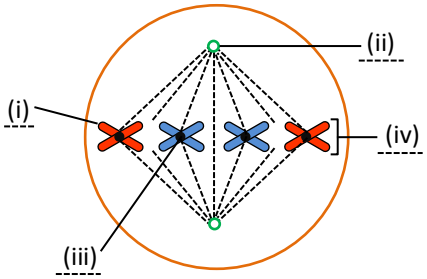
(1) Transition to Metaphase
(2) Transition to Anaphase-II
(3) Transition to Metaphase-I
(4) Transition to Anaphase

7. The drawing below shows a cell whose diploid chromosome number is four. This cell is in:-



(1) Metaphase of mitosis
(2) Anaphase of mitosis
(3) First anaphase of meiosis
(4) Second anaphase of meiosis

8. Label the structures indicated by (i), (ii), (iii) and (iv) in below given diagram -



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(1) (i)-Chromatid, (ii)-Centriole, (iii)-Centromere, (iv)-Chromosome
(2) (i)-Chromosome, (ii)-Centriole, (iii)-Centromere, (iv)-Chromatid
(3) (i)-Chromatid, (ii)-Centromere, (iii)-Centriole, (iv)-Chromosome
(4) (i)-Chromosome, (ii)-Centromere, (iii) Centriole, (iv)-Chromatid

9. Interkinesis is stage between :-
(1) Two mitotic divisions
(2) Two phases of meiotic divisions
(3) Anaphase and telophase
(4) Leptotene and zygotene

10. It is significant to note that in the 24 hour average duration of cell cycle of human cell, cell division proper lasts for only about:-
(1) Four hours (2) 90 minutes
(3) An hour (4) 10 hours

11. In which stage of mitotic division, cells do not show Golgi complex, ER, nucleolus and nuclear envelope ?
(1) Metaphase
(2) Late prophase
(3) Anaphase
(4) All of these

12. Condensation of chromosomes is completed in:-
(1) Prophase (2) Interphase
(3) Metaphase (4) Anaphase

13. Regarding to cell cycle which of the following statements is wrong ?
(1) Cytoplasm increase is a continuous process
(2) DNA synthesis occurs only during one specific stage
(3) Replicated chromosomes distributed to daughter nuclei by complex series of events
(4) Events for replicated chromosomes distribution are not under genetic control

14. About cell cycle, which of the following statements is correct ?
(1) In G_0 phase cells are metabolically inactive
(2) In G_0 phase cells are metabolically active
(3) Diploid somatic cells of animals divide only by meiotic division
(4) In plants only haploid cells can show mitotic divisions

15. Chromatin condensation and movement of duplicated centrioles towards opposite poles can be observed during-
(1) Prophase (2) Metaphase
(3) Anaphase (4) Telophase

16. Regarding arrangement of chromosomes on equator during metaphase, which of the following statements is incorrect ?
(1) Each chromatid remains connected by one spindle fibres from both poles
(2) Each chromosome remains connected by spindle fibres from both poles
(3) Spindle fibres remain attached on kinetochores of both the chromatids
(4) Each chromatid remains connected at one pole by spindle fibres

17. Match the following -

(a) Prophase	(I) Decondensation of chromosome
(b) Metaphase	(II) Division of centromere
(c) Anaphase	(III) Attachment of spindle fibres on kinetochores of chromosomes
(d) Telophase	(IV) Initiation of assembly of mitotic spindle

Options :-
(1) a–(IV) b–(III) c–(I) d–(II)
(2) a–(IV) b–(III) c–(II) d–(I)
(3) a–(III) b–(IV) c–(II) d–(I)
(4) a–(III) b–(IV) c–(I) d–(II)

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18. Which of the following is not a significance of mitosis ?
(1) Maintenance of identical genetic complement
(2) Cell repair
(3) Restore nucleo cytoplasmic ratio
(4) Genetic variability

19. Meiosis ensures the production of ..... phase in life cycle of sexually reproducing organism, where as fertilisation restores ..... phase.
(1) diploid, haploid (2) haploid, triploid
(3) diploid, triploid (4) haploid, diploid

20. Regarding key features of meiosis select out the wrong one -
(1) Meiosis involves two sequential cycles of nuclear and cell division called meiosis- I & meiosis- II
(2) Meiosis is initiated after the parental chromosomes have replicated to produce identical sister chromatids at the S - Phase
(3) Meiosis involves pairing of homologous chromosomes and recombination between non homologous chromosome
(4) Four haploid cells are formed at the end of meiosis-II

21. Select the odd one -
(1) Zygotene – Synaptonemal complex appearance
(2) Pachytene – Appearance of recombination nodule
(3) Diplotene – Terminalisation of chiasmata
(4) Diakinesis – Assembly of meiotic spindle

22. A cell has 46 chromosomes at each pole in mitotic telophase. In this division the number of chromatids at the metaphase was :-
(1) 23 (2) 46 (3) 92 (4) 69

23. Match the following -

(a) Prophase-II	(I) Enclosure of chromosomes in nuclear envelope
(b) Metaphase-II	(II) Separation of sister chromatids
(c) Anaphase-II	(III) Chromosome alignment on equator
(d) Telophase-II	(IV) Disappearance of nuclear membrane

Options :-
(1) a–(IV) b –(III) c–(I) d–(II)
(2) a–(IV) b–(III) c–(II) d–(I)
(3) a–(IV) b–(II) c–(III) d–(I)
(4) a–(IV) b–(I) c–(II) d–(III)

24. Which of the following is not a significance of meiosis ?
(1) Helps in conservation of specific chromosome number in each species
(2) Increase in genetic variability
(3) Helps in evolution
(4) Helps in growth of organism

25. Number of chromatids in each chromosome at anaphase is-
(1) One in mitosis, one in meiosis-I and two in meiosis-II
(2) One in mitosis, two in meiosis-I and one in meiosis-II
(3) Two in mitosis, one in meiosis-I and two in meiosis-II
(4) Two in mitosis, two in meiosis-I and two in meiosis-II

26. During meiosis how many cycles of nucleus division, DNA replication and division of centromere take place respectively ?
(1) Three, Two, One
(2) One, Two, Two
(3) Two, Two, One
(4) Two, One, One

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27. Cell cycle includes :-
(1) Cell division (2) DNA replication
(3) Cell growth (4) All of the above

28. Interphase of an animal cell is differ from interphase of a plant cell :-
(1) in having DNA replication
(2) in having centrioles duplication
(3) in having growth of cell
(4) in having metabolically active cell

29. Multinucleated condition in the liquid endosperm of coconut arises because :-
(1) DNA replication not occurs during cell cycle
(2) Separation of sister chromatids not occurs in anaphase
(3) Condensation of chromosomal material not occurs in prophase
(4) Karyokinesis is not followed by cytokinesis

30. Which of the following phases can last for months or years in oocytes of some vertebrates ?
(1) Leptotene (2) Zygotene
(3) Pachytene (4) Diplotene

EXERCISE-III(B) ANALYTICAL QUESTIONS

31. Which of the following organelles can be observed in a cell even after completion of prophase?
(1) Golgi complex
(2) Mitochondria
(3) Nucleus
(4) Endoplasmic reticulum

32. A mouse cell is treated with a chemical that interferes with the activity of actin protein. Which of the following will probably be affected the most?
(1) Formation of spindle fibres
(2) Division of cytoplasm
(3) Chromosome duplication
(4) Pairing of homologous chromosomes

33. Number of chromosome pairs at equator in metaphase-I of a diploid plant cell (for which n = 25) shall be-
(1) 50 (2) 100 (3) 75 (4) 25

34. In a diploid cell before S-phase if quantity of DNA is 20 pico gram (pg) then after meiosis I what will be the quantity of DNA in each daughter cell ?
(1) 10 pg (2) 20 pg
(3) 5 pg (4) 40 pg

35. Diploid cell in human, where cell division does not occur :-
(a) Heart cell (b) Muscle cell
(c) Nerve cell
Options :-
(1) Only c (2) b and c
(3) a and c (4) a, b and c

36. Given below are two statement -
Statement-I : M-phase is the most dramatic phase of cell cycle, involving a major reorganisation of virtually all component of cell.
Statement-II : Cells in G_0-stage remain metabolically inactive but no longer proliferate unless called on to do so depending on the requirement of the organism.
In the light of the above statements, choose the correct answer from the options given below -
(1) Both statement I and statement II are correct
(2) Both statement I and statement II are incorrect
(3) Statement I is correct but statement II is incorrect
(4) Statement I is incorrect but statement II is correct

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37. **Assertion (A) :** Meiosis ensures the production of haploid phase in the life cycle of sexually reproducing organism.
Reason (R) : Meiosis involve reduction in chromosome number to half as that of parent cell.
(1) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(2) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(3) Assertion is True but the Reason is False.
(4) Both Assertion and Reason are False.

38. **Assertion (A) :** Cytokinesis in plant cell occur by cell plate formation method.
Reason (R) : Cytokinesis in animal cells occur by the formation of cell farrow.
(1) Both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(2) Both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(3) Assertion is True but the Reason is False.
(4) Both Assertion and Reason are False.

39. **Assertion (A) :** No replication of DNA is needed between meiosis-I and meiosis-II.
Reason (R) : Chromosomes are already duplicated and they already have two sister chromatids.
(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
(2) (A) is correct but (R) is not correct.
(3) (A) is incorrect but (R) is correct.
(4) Both (A) and (R) are correct but (R) is the correct explanation of (A).

40. What will be the ratio of number of chromosomes and amount of DNA in G_1, S and G_2 phases for a somatic cell?

	G_1	S	G_2
(1)	1 : 1	1 : I	1 : 1
(2)	1 : 1	1 : 2	I : 2
(3)	1 : 2	1 : 2	I : 2
(4)	1 : 2	1 : 1	1 : 2

Exercise - III ANSWER KEY

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Answer	1	4	3	2	4	1	3	1	2	3	4	3	4	2	1
Question	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Answer	1	2	4	4	3	3	3	2	4	2	4	4	2	4	4
Question	31	32	33	34	35	36	37	38	39	40					
Answer	2	2	4	2	4	3	1	2	4	2					

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Important Notes